



At left, employees of Intellinet Corporation, Baltimore, Maryland, are fabricating units of the company's Power Phaser[®] Series MSP-II solid state motor starters; a completed unit is shown at right center. The starters electronically regulate the starting current and running voltage of any alternating current (AC) motor; they are designed to reduce energy consumption, lower maintenance costs and extend motor life. The Power Phaser systems incorporate technology originally developed at Marshall Space Flight Center (MSFC) as part of NASA's energy conservation research in support of the Department of Energy.

In the mid-seventies, MSFC sought to find a way of curbing power wastage caused by the fact that AC motors operate at a fixed voltage. The fixed voltage is what motors need to handle the heaviest loads they are designed to carry. But a motor usually does not operate at full load conditions. Nonetheless, it gets full-load voltage while operating at less than full-load, even while idling, and the cumulative power wastage—considering the millions of

electric motors in service—is of enormous order.

MSFC engineer Frank Nola came up with an answer: a device called the Power Factor Controller (PFC) that matches voltage with the motor's actual need. Plugged into a motor, it continuously determines motor load by sensing shifts in the relationship between voltage and current flow. When the PFC senses a light load, it cuts the voltage to the minimum needed; this in turn reduces current flow and heat loss. Laboratory tests showed that the PFC could trim power used by six to eight percent under normal motor load conditions and as much as 65 percent when the motor was idling. With such potential for energy savings, the PFC quickly became one of the most widely adopted technology transfers; more than 150 companies sought and were granted NASA licenses for commercial use of the technology.

Intellinet used the PFC technology as a departure point for its own five-year research and development effort that culminated in the introduction of the Power

Phaser MSP-II motor starter, featuring "soft-start" and "load-responsive" control modes. In the soft start mode, the system controls the voltage applied to the motor so that the motor accelerates gradually and smoothly, rather than abruptly; this protects motor, gears and belts from mechanical stresses caused by instantaneous starting. The Load-Responsive[™] control tunes voltage to match the motor to its load almost 200 times a second; during periods when motor loads are light or line voltage is high, the Load-Responsive circuit automatically reduces operating voltage without reducing motor speed.

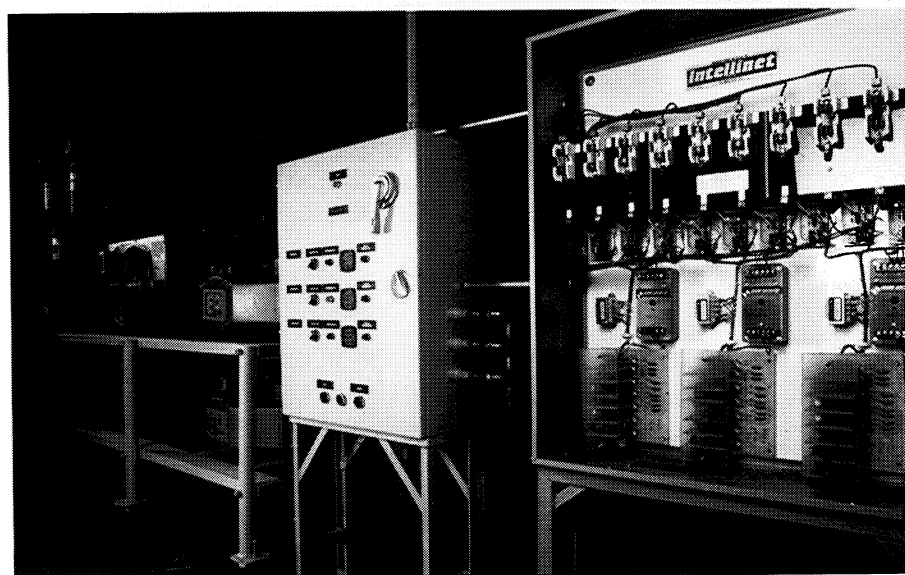
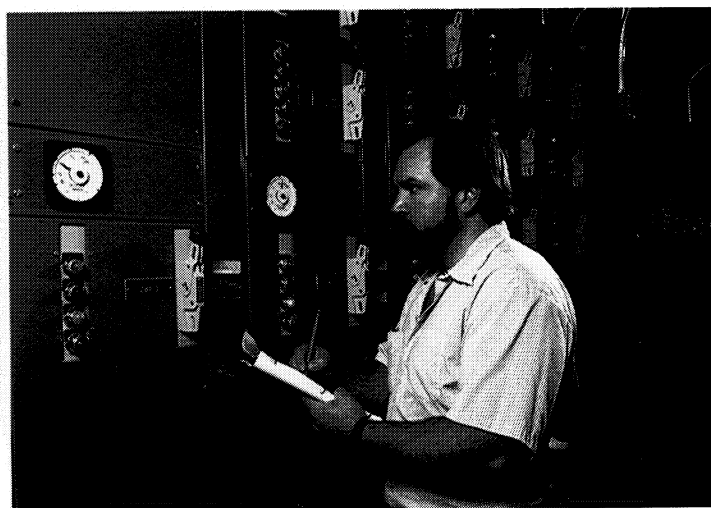
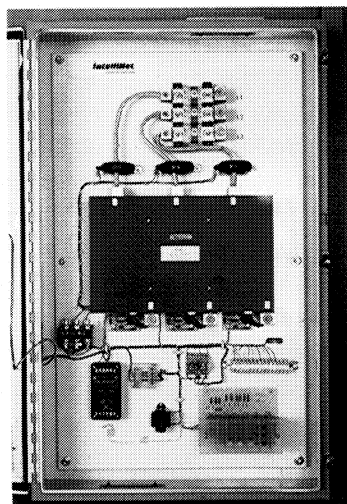
MSP-II starters also have a number of motor protection features, including the basic fact that curbing excess energy lowers motor heat and thus extends the useful lives of electrical insulation and bearing lubricants. Another feature is a proprietary Diagnostic Module, whose indicator lights help in quickly isolating faults in the control system, power line or motor and load.

The photos illustrate some applications of the MSP-II starters. At upper right an engineer is checking gages after a comparison test at an industrial facility.

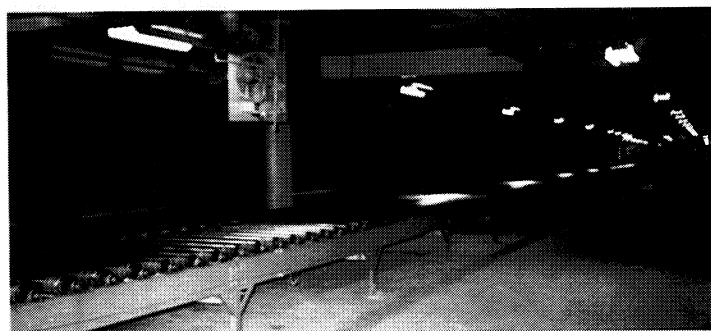
The gage at his left monitored a motor equipped with an Intellinet starter/controller; it registered power usage some 25 percent less than the right gage, which checked a motor not equipped with the Power Phaser.

At Baltimore's Fort Howard Veterans Administration Hospital, the patient air system supports kidney dialysis and other critical procedures. Because the system must be available at all times, it is supported by the hospital's emergency power system in the event that public utility power fails. In emergency tests, starting surges from the system's three compressor motors, cycling off and on in response to air pressure demand, overloaded and cut off part of the hospital's backup system. Intellinet provided a motor control center (right) equipped with three Power Phasers and now, because of the soft-start feature, emergency power tests work without a hitch, no matter what the cycle rate.

At a United States Gypsum factory, starting the final segment of a 750-foot-long conveyor (right) sometimes broke drive chains and interrupted production for several hours.



Intellinet field engineers studied the problem and supplied a motor starter that operates with a variable-speed drive and provides smooth starts; it solved the problem. ▲



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